SHORT REPORT

Primitive reflexes in Parkinson's disease

Fred W Vreeling, Frans R J Verhey, Peter J Houx, Jellemer Jolles

Abstract

A standardised protocol for the examination of 15 primitive reflexes in which the amplitude and the persistence were scored separately, was applied to 25 patients with Parkinson's disease and an equal number of healthy matched control subjects. Most reflexes were found considerably more often in the patients than in the control subjects, especially the snout, the glabellar tap, and its variant, the nasopalpebral reflex. Only the mouth open finger spread reflex was present more often in the control subjects. For all reflexes except this last, the scores for amplitude and persistence of the reflexes for the control group never exceeded the scores for the patient group. Reflexes persisted more often in the patients than in the control subjects. Parkinsonism alone can explain a large number of primitive reflexes, irrespective of the severity or duration of the disease. In contrast, the number of reflexes was related more closely to cognitive scales. It is concluded that such reflexes may be helpful in diagnosing Parkinson's disease. In addition, a standardised protocol for eliciting and scoring is essential for the study of these reflexes in parkinsonism and other neuropsychiatric conditions.

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University of Limburg, Maastricht, The Netherlands

Department of Neurology
F W Vreeling

Department of Neuropsychology and Psychobiology
F R J Verhey
P J Houx
J Jolles

Correspondence to:
Dr F W Vreeling, Department of Neurology, University of Limburg, PO Box 616, 6200 MD Maastricht, The Netherlands.

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The prevalence and clinical value of primitive reflexes in Parkinson's disease have been discussed by many authors.[1–4] Although some of these reflexes can be elicited in normal adults[5] and in patients with focal lesions,[6] they are found more often in patients with diffuse, hemispherical disease.[7–10]

The glabellar tap,[2 3 11 12] the snout,[1 2 10] and palmomental[1 2 4 13] reflexes are especially frequently found in Parkinson's disease. The proportion of glabellar tap, snout, nasopalpebral, suck, and grasp reflexes increases with the severity of the disease.[3 8] Findings for the palmomental reflex are controversial.[2 3 13] The presence of primitive reflexes increases with cognitive impairment.[2 8 10] No relationship has been found between the reflexes and the duration of the disease or the degree of depression of the patient.[2 8] In other studies, the incidence of the palmomental and the snout reflexes was not significantly different in patients with Parkinson's disease and healthy, age matched control subjects.[1 5] Although a positive glabellar tap reflex is considered to be an important diagnostic sign of parkinsonism,[14] it is also found in patients with intracranial disease who do not show any other signs, or who show symptoms of a clearly symptomatic parkinsonism.[3 6] In one study, the glabellar tap reflex correlated best with the extent of the lesion and not with the site of the lesion.[3] Several authors have reported the reversal of this reflex in patients after therapy with levodopa,[11 12 15] amantadine,[11] or lisuride[16]; other authors, however, have not confirmed these findings.[1 8] In another study, the palmomental reflex was found to be even more reliable than the glabella reflex as a clinical indicator of Parkinson's disease.[13]

To summarise, the published findings and conclusions on primitive reflexes in parkinsonism are often confusing, controversial, or not readily compatible. This is not because of false diagnoses or heterogeneity of the patient groups studied, but mainly because of a lack of compatibility of methodology used to elicit and score the primitive reflexes and the small numbers of (mutually different) reflexes in the various studies.

Recently, we found that experienced neurologists differ considerably in how they elicit and judge primitive reflexes.[17] Reliable measurement in adult patients with neurological disease therefore requires a very elaborate protocol. A standardised protocol for the study of a 'primitive reflex profile' has not been applied in Parkinson's disease. Most studies have examined only one, and rarely two or three, primitive reflexes.[1–3 8 9]

The aim of the present study was therefore to apply a standardised and semiquantified test battery of 15 primitive reflexes to patients with Parkinson's disease to determine the prevalence and the clinical value of these reflexes, compared with healthy controls, by correlating them to parameters such as severity and duration of the disease, cognitive functioning, and depression. The battery that was chosen was found to have high inter-observer and intra-observer reliability.[17] The primitive reflexes included: the glabellar tap; palmar and plantar grasp; palmomental and pollicomental; rooting; snout; suck; head retraction; nuchocephalic; asymmetrical tonic neck; mouth open finger spread (MOFS);

and palmar and plantar support reflexes. Most of these are well known in research on neurological ageing.[7] The last four reflexes have potential value for use in adults.[18 19] A variant of the glabellar tap reflex, the nasopalpebral reflex, was added to the battery, because of its presumed clinical value in parkinsonism.[3 20]

Method

SUBJECTS

Twenty-five patients with a diagnosis of primary, degenerative Parkinson's disease were selected at random from the neurological outpatient clinic. All had undergone an extensive general and neurological examination, biochemical analysis and CT of the brain, to exclude other causes of parkinsonism. Twenty-five healthy control subjects were matched to the patients with respect to age and sex.

All patients underwent the following examinations (table): the reflex battery; the Webster rating scale for severity of disease[21]; the Hoehn and Yahr scale for staging of parkinsonism[22]; the global deterioration scale (GDS)[23] and the mini mental state examination (MMSE)[24] for assessment of cognitive functioning; and the Zung depression scale.[25] The control subjects underwent a neurological examination including the reflexes; none of them showed any neurological sign, or mental deterioration or depression in neurocognitive testing.

PROTOCOL OF THE PRIMITIVE REFLEX BATTERY

Briefly, a basic position was described and the subject was given instructions as to what was expected of him or her—for example, sitting or standing; eyes open or closed, etc.). The subject was not informed about the nature of the expected response, but was always informed about the nature of the stimulus in order to prevent startle reactions, which might influence the required response. Every reflex was measured at least three times, with about two seconds between each elicitation, except for the glabellar tap and the nasopalpebral reflexes, which were applied two times per second. All reflexes were assessed for amplitude and persistence, as proposed by other investigators.[4 13] If apt, the reflexes were elicited on both sides.

Table Characteristics of patients and control subjects

	Patients	*Controls*
Number of subjects	25	25
Age (years)	66·5 (9·5)	67·5 (9·5)
Age range (years)	40–84	40–82
Sex	18 M/7 F	18 M/7 F
GDS	2·0 (0·9)	1·0
MMSE	27·4 (2·4)	N/A
MMSE (range)	21–30	N/A
Zung depression scale	32·6 (8·0)	N/A
Hoehn and Yahr	2·3 (0·9)	0
Webster	11·5 (4·4)	N/A
Parkinsonism since (years)	8·0 (6·2)	N/A
Diagnosed since (years)	6·4 (5·4)	N/A

Unless indicated otherwise, mean values are given. Numbers in parentheses denote standard deviations.
GDS = Global deterioration scale; MMSE = Mini mental state examination; N/A = not applicable.

SCORING

Amplitude and persistence of the reflex were scored separately. A three point scale for both characteristics was used. The scoring was as follows: for amplitude, 0 = absent; 1 = a weak to moderate response; and 2 = a strong response. A well defined description for the weak to moderate and strong amplitudes is given for each reflex. For persistence, 0 = absent; 1 = response for one to four consecutive times; and 2 = response for four or more consecutive times. The glabellar tap and the nasopalpebral reflexes were considered to be present but exhaustible after four to 10 consecutive responses and to be persistent after more than 10 consecutive responses, respectively. This is in accordance with the procedure followed by others.[2] A detailed description of instructions, position, method of elicitation, and scoring of each reflex is given elsewhere.[26]

Results

The prevalence of primitive reflexes in patients and control subjects is shown in the figure. The prevalence increased with age in the control group ($p < 0.01$), but not in the patient group. The average number of reflexes per individual was, irrespective of age, however, considerably higher in the patients than in the control subjects: 4·6 and 0·8, respectively. For patients younger than 60 years this was 3·9 (SD 0·2), between 60 and 70 years 5·4 (SD 0·5), and for those older than 70 years 3·7 (SD 1·9). There was no difference between men and women.

All but one of the reflexes occurred more frequently in patients than in the control subjects. The overall difference in frequencies per reflex was significant ($p < 0.01$). The glabellar tap and snout reflexes occurred in nearly all patients (96 and 92%, respectively). These reflexes were also present in 12 and 20% of the control subjects, respectively. The nasopalpebral reflex occurred in 88% of the patients but in none of the control subjects. The palmomental and pollicomental reflexes were also found more often in patients than in the control group; so were the suck and left nuchocephalic reflexes, albeit to a lesser extent. Only the left MOFS was present more often in the control subjects (20%) than in the patients (4%). Six reflexes (asymmetric tonic neck, palmar and plantar grasp, head retraction, rooting, and plantar support) were absent in both groups.

In the control subjects, amplitudes were never scored as 'strong' and only four out of 21 responses were persistent (19%). In the patients, the amplitude was scored as 'strong' six times, of which four were for the snout reflex; more than half of the responses, however, (64 out of 118) were scored as 'persistent' (54%). The most frequently persisting reflexes were the glabellar tap (19/24), the nasopalpebral (11/22), the snout (19/23), and the suck reflexes (5/8). Only the persistence of reflexes, not the amplitude, was related to the patient group.

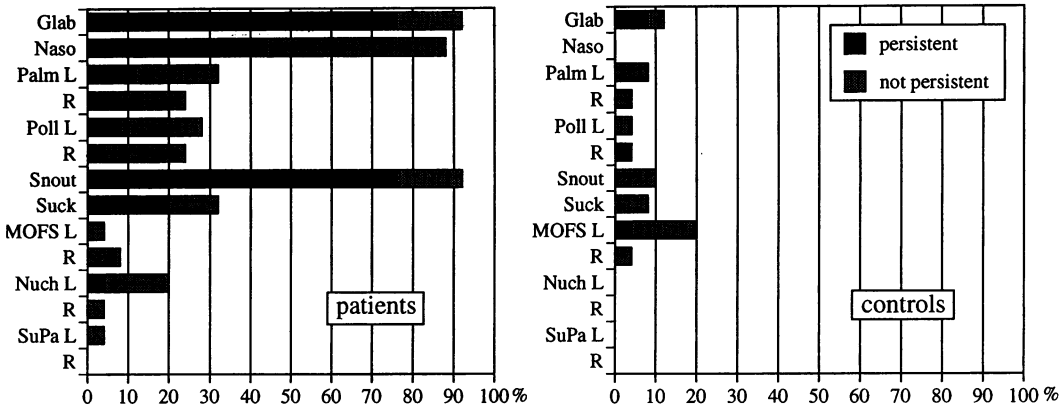

Figure Percentage of patients with Parkinson's disease (left) and healthy control subjects (right) showing primitive reflexes. Glab = glabellar tap; Naso = nasopalpetral reflex; Palm = palmomental reflex; Poll = pollicomental reflex; Snout = snout reflex; Suck = suck reflex; MOFS = mouth open finger spread reflex; Nuch = nuchocephalic reflex; SuPa = palmar support reflex.

The average number of reflexes did not increase with the duration of the disease, which was estimated retrospectively after the initial symptoms (range 2–25 years, mean 8·0, SD 6·2), or with the number of years since the diagnosis of Parkinson's disease had been established by a physician (range 1–22 years, mean 6·4, SD 5·4). Hoehn and Yahr, and Webster scores were closely related ($p < 0·01$), but did not show a significant correlation with the number of primitive reflexes. The number increased with the GDS: patients in stage 1–2 ($n = 18$) showed an average of 4·2 reflexes; patients in stage 3–4 ($n = 9$) showed 5·6 ($p < 0·01$). MMSE ratings were also weakly related ($p < 0·05$). Depression did not correlate with reflexes, but it did with the time since the diagnosis ($p < 0·05$), was established. Age did not correlate with the number of reflexes, but it did—slightly—with the Webster, Hoehn and Yahr, GDS, and MMSE scores ($p < 0·05$).

Discussion

Once an individual has definite symptoms of Parkinson's disease, some primitive reflexes show up and persist. The number of reflexes does not increase with the duration or severity of the disease. The correlation with the MMSE and GDS is compatible with the view that these reflexes are a sign of diffuse cerebral dysfunction, rather than a symptom of a distinct neurological disease.[3 6 9 10 27]

Our results confirm other findings concerning the most frequently found reflexes. Some state that the persisting glabellar tap sign is probably the best correlative test in Parkinson's disease.[10 14] Gimenez-Roldan *et al*[13] found the palmomental reflex to be an even more reliable clinical indicator. Our results are not in agreement with this, but they do agree on the amplitude and persistence of the palmomental reflex. The (re-) appearance of the nasopalpebral reflex is interesting, from an ontogenetic as well as from a historical point of view.[20] In our study, compared with healthy control subjects, this reflex seems to have an almost equally great sensitivity, and an even greater specificity for parkinsonism than the glabellar tap reflex. The snout reflex equals the glabellar sign as to specificity and sensitivity. The asymmetry of the nuchocephalic reflex was not associated with unilateral parkinsonism, in contrast to the palmomental reflex in Maertens de Noordhout's study.[4]

We could not test the negative correlation between the glabellar tap and the palmomental reflexes and dyskinesia reported by Iriarte *et al*,[28] since too few patients showed dyskinesia. As for the reversal of reflexes—for example, the glabellar tap, after starting levodopa, lisuride, or amantadine treatment, we could not test this because our patients were on a stable drug regimen. Levodopa was taken by 56% of the patients, amantadine by 48%, and the combination of both drugs by 16%. The glabellar sign was present in 96% of our patients, and 79% of these positive responses showed persistence. According to some authors, looking for these reflexes could give an objective, although indirect, evaluation of the patient's dopaminergic status.[4 11 12] This was not confirmed by Huber and Paulson.[29] Our findings do not support the view of Messina *et al*[11], and Klawans *et al*[12] about the habituation or reversal of the glabellar sign.

The present findings suggest that the glabellar tap, nasopalpebral, and snout reflexes, and especially their persistence, may be of relevance in the examination of patients with Parkinson's disease, in view of suggestions that persistence or amplitude, or both, are correlated with the degree of cerebral degeneration.[2 6 8 10 12 17] A standardised protocol on how to elicit and score primitive reflexes is required for the study of a broad profile of these signs in neuropsychiatric disorders.

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